FILTER FACTS

VOLUME 5

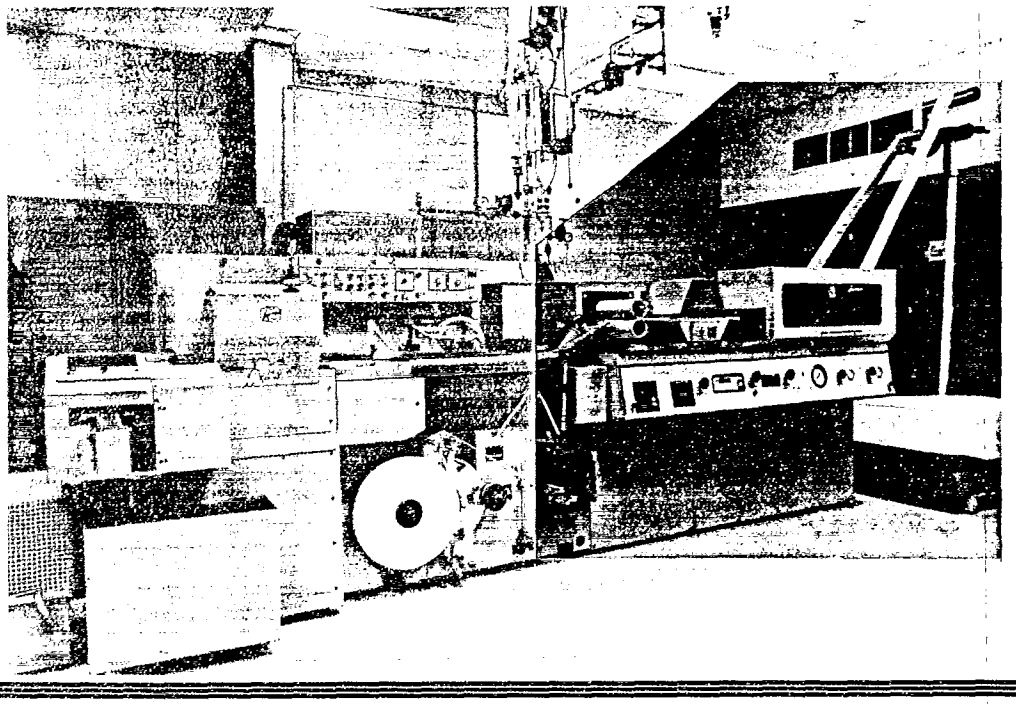
FROM THE PEOPLE AT EASTMAN

EASTMAN'S E-80 PROCESS

Eastman has designed a new tow blooming process, the E-80, that operates at speeds up to 600 meters per minute and provides:

- a high degree of filament separation and crimp retention
- extended capability ranges
- stable filter rod properties during speed changes
- improved plasticizer application
- low pressure pneumatic blooming

Eastman's E-80 Process Coupled to a Hauni KDF-2 Plugmaker



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HIGH SPEED TOW PROCESSING

Several manufacturers of cigarette-making equipment have introduced machines capable of manufacturing cigarettes at 6500 units per minute or faster. With these advancements, we anticipate that filter rod makers that will operate at speeds of 600 meters per minute will be developed in the near future.

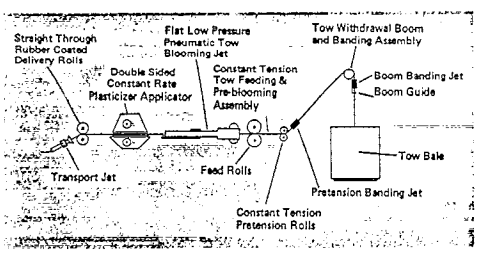
In anticipation of the development of high-speed equipment, Eastman conducted an investigation to determine the effects of increased filter tow processing speeds on filter rod properties. The speeds investigated ranged from 200 to 600 meters per minute. This study identified several problem areas that may be encountered at the higher operating speeds, such as reduced capability range and the change in rod properties as plugmaker speed changes.

A NEW TOW PROCESSING UNIT

Eastman has designed the E-80 process to overcome the major deficiencies of commercially available differential-tension-type, tow-blooming processes when operated at speeds up to 600 meters per minute. A process schematic of the E-80 process is shown in Figure 1.

Figure 1

E-80 Low-Pressure Pneumatic Tow Blooming Process



The tow is withdrawn from the bale and banded with two low-pressure banding jets before it enters a set of idler-type pretension-rolls. A set of driven feed rolls downstream from the pretension rolls applies uniform tension to the tow band to begin blooming or fiber separation. The E-80 pneumatic blooming jet receives the tow from the feed rolls, completes the blooming, and relaxes the tow in a bustle. A set of driven delivery rolls pulls the bloomed tow from the bustle through a dual-sided plasticizer applicator, then delivers the tow to a low pressure tow transport jet which forwards the tow to the garniture of the plugmaker.

The pretension rolls are of a low-inertia type. Accordingly, they are very responsive to changes in tow tension and effectively maintain a constant tension input to the feed rolls.

A smooth surfaced feed roll is used rather than a grooved or threaded roll. A smooth roll used in conjunction with pneumatic blooming provides a uniform extension of the entire tow band in the tension zone; is less likely to cause roll wraps; is easier to clean and maintain; and causes less wear on the surface of the mating rubber roll.

The E-80 pneumatic blooming jet is the heart of this new process. The inner construction of the jet is shown in Figure 2. Low pressure air enters the jet from both the top and bottom sides of the nozzle assembly and intermixes with the tow, pulling it tightly from the feed rolls and conveying it down the diverging throat assembly into a bustle. The tow rapidly decelerates in the bustle while the compressed air is allowed to escape through top and bottom vents. The individual filaments are bloomed by the compressed air as it expands and escapes from the bustle. The tow is pulled from the bustle by the delivery rolls.

Figure 2

E-80 Pneumatic Blooming Jet

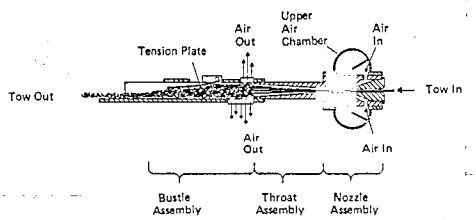


Figure 3 shows a sketch of the plasticizer applicator. Plasticizer is metered onto transfer rolls above and below the tow band by manifolds. The transfer rolls carry a uniform film of plasticizer to rotating brushes which propel plasticizer droplets at high-velocity onto and through the tow. The plasticizer is supplied to the system by positive displacement pumps that are driven by the plugmaker drive shaft so that the amount of plasticizer applied to the tow remains constant regardless of plugmaker speed. The constant width of the relaxed tow band combined with the double-sided applicator provides uniform plasticizer application over a wide range of plugmaker speeds, resulting in improved filter rod firmness.

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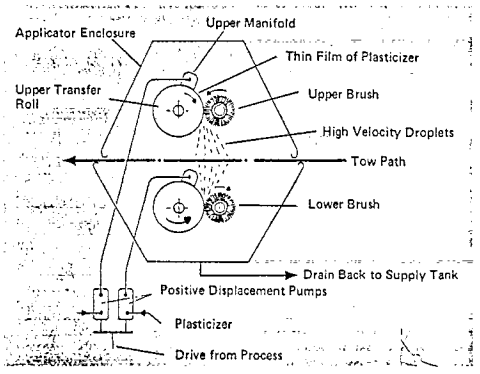
Figure 3

Double Sided Plasticizer Applicator



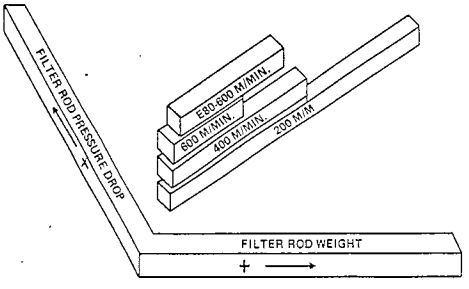
E-80 PERFORMANCE CHARACTERISTICS

Figure 4 shows the effect that increased processing speeds have on the capability range of typical tow specifications processed on equipment using a differential-tension type of tow blooming process and a tow transport jet. Examples of this equipment are the Eastman Miniature, the Hauni AF-1, and the Hauni AF-2 processes. In Figure 4 it can be seen that as processing speeds increase, the maximum points of the capability range are reduced while the minimum points remain relatively stable. At a processing speed of 600 meters per minute, a pressure drop range of less than 100 millimeters is typically obtained.

At comparable operating speeds, the E-80 has a longer capability curve than the differential-tension blooming processes. As shown in Figure 4, at 600 meters per minute, the E-80 tow capability curve has a slightly higher minimum point but is approximately twice as long as conventionally processed tows at the same speed.

Figure 4

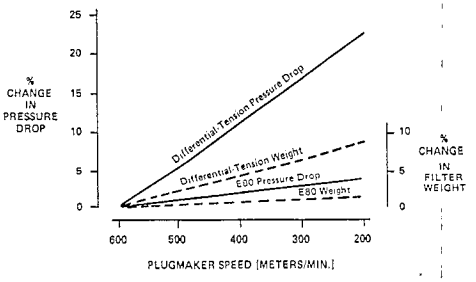
Effect of Plugmaker Speed on Capability Range



The stability of rod properties during changes in plugmaker speeds is better with the E-80 Process than with differential-tension-type processes. Figure 5 illustrates the effect that plugmaker speed changes have on filter rod weight and pressure drop when using a differential-tension-type process compared to the E-80 tow-blooming process. In addition to start-up and shutdown, plugmaker speed changes occur during plugwrap bobbin changes. Speed changes may also be initiated automatically to satisfy the varying demands of mass rod storage systems when they are utilized. If a differential-tension-type process is adjusted to obtain optimum bloom while operating at 600 meters per minute, and if the speed is subsequently reduced to 200 meters per minute, the tow will become underbloomed and the filter weight and pressure drop will increase, often beyond acceptance limits. The E-80 process is not speed sensitive and maintains more stable filter weight and pressure drop at target conditions during speed changes.

Figure 5

Effect of Plugmaker Speed Changes on Filter Rod Properties



SUMMARY

The E-80 process technology offers solutions to many of the problems of processing filter tows at speeds of 400 meters per minute and greater.

The pneumatic blooming used by the process ensures high degrees of filament separation and crimp retention. This results in optimum yield and adequate capability ranges at higher operating speeds. The dual-sided plasticizer applicator provides a uniform and constant application that will result in firmer filter rods. The process is not speed sensitive and maintains stable filter weight, pressure drop, and plasticizer application during speed changes.

Additional information on the E-80 process can be supplied through your Eastman representative.

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